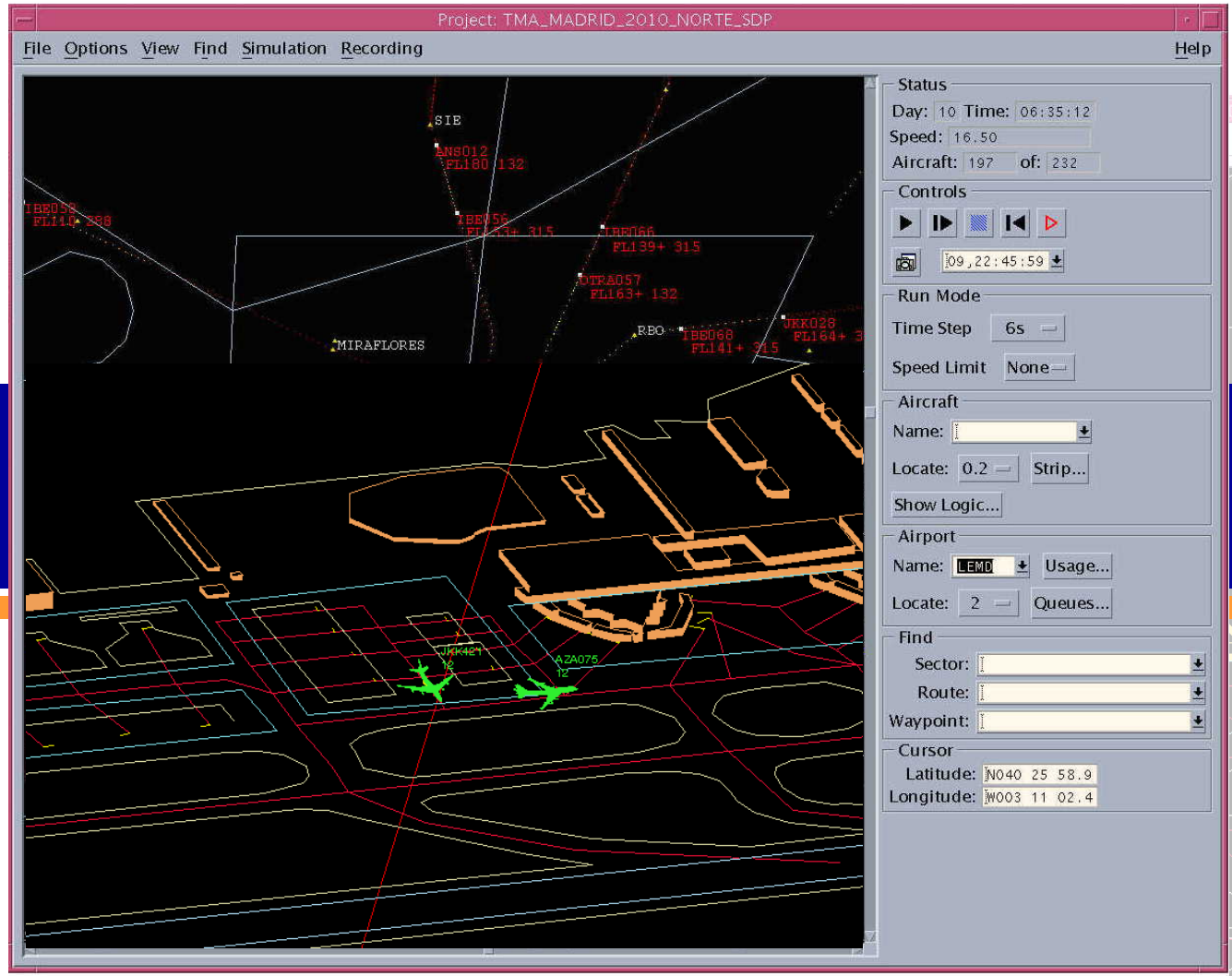


AP9&AP5 Technical Interchange Meeting

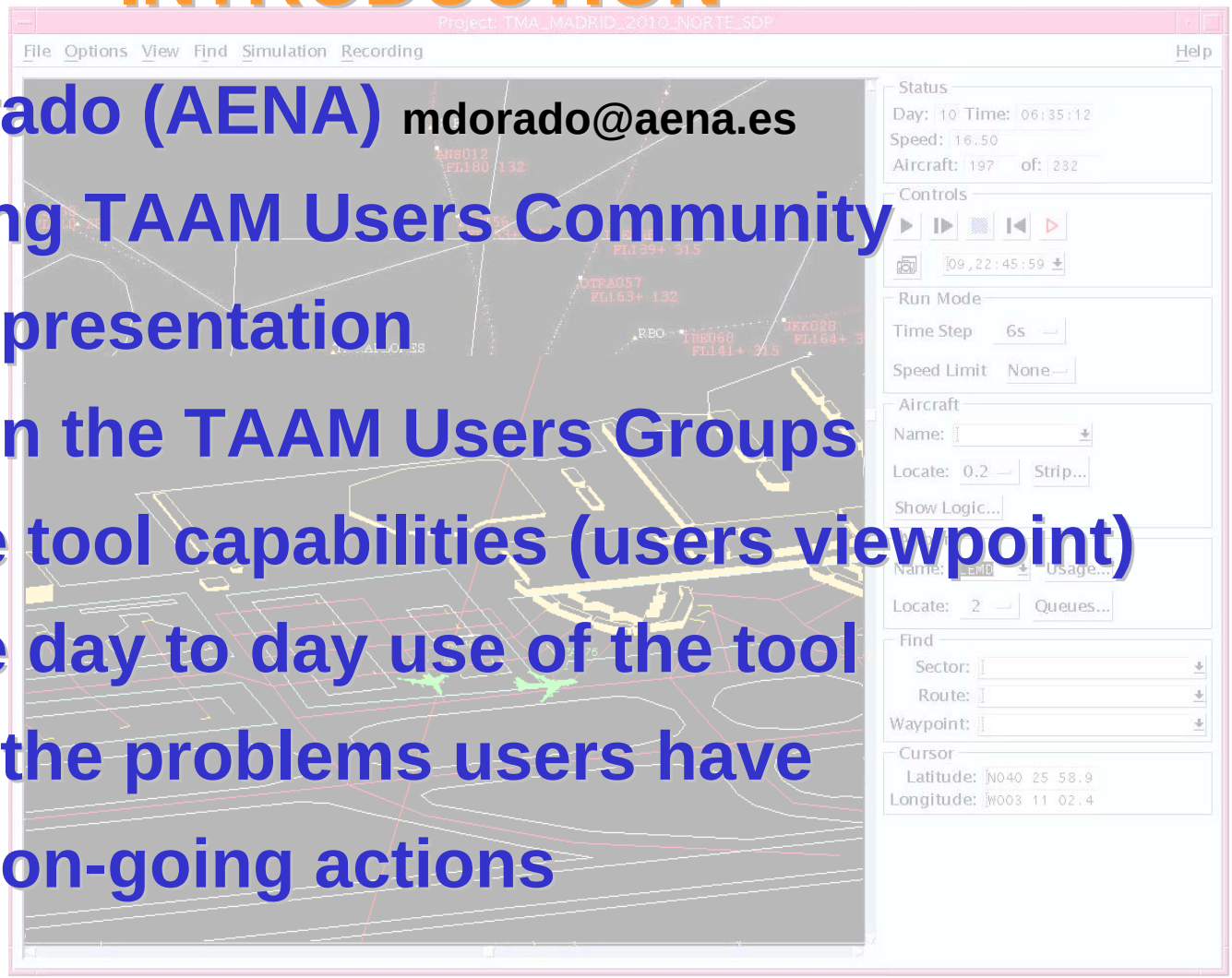
Paris

4-6 November 2003

TAAM Users VIEWPOINT

Manuel M. Dorado (AENA)
Representing TAAM User Group

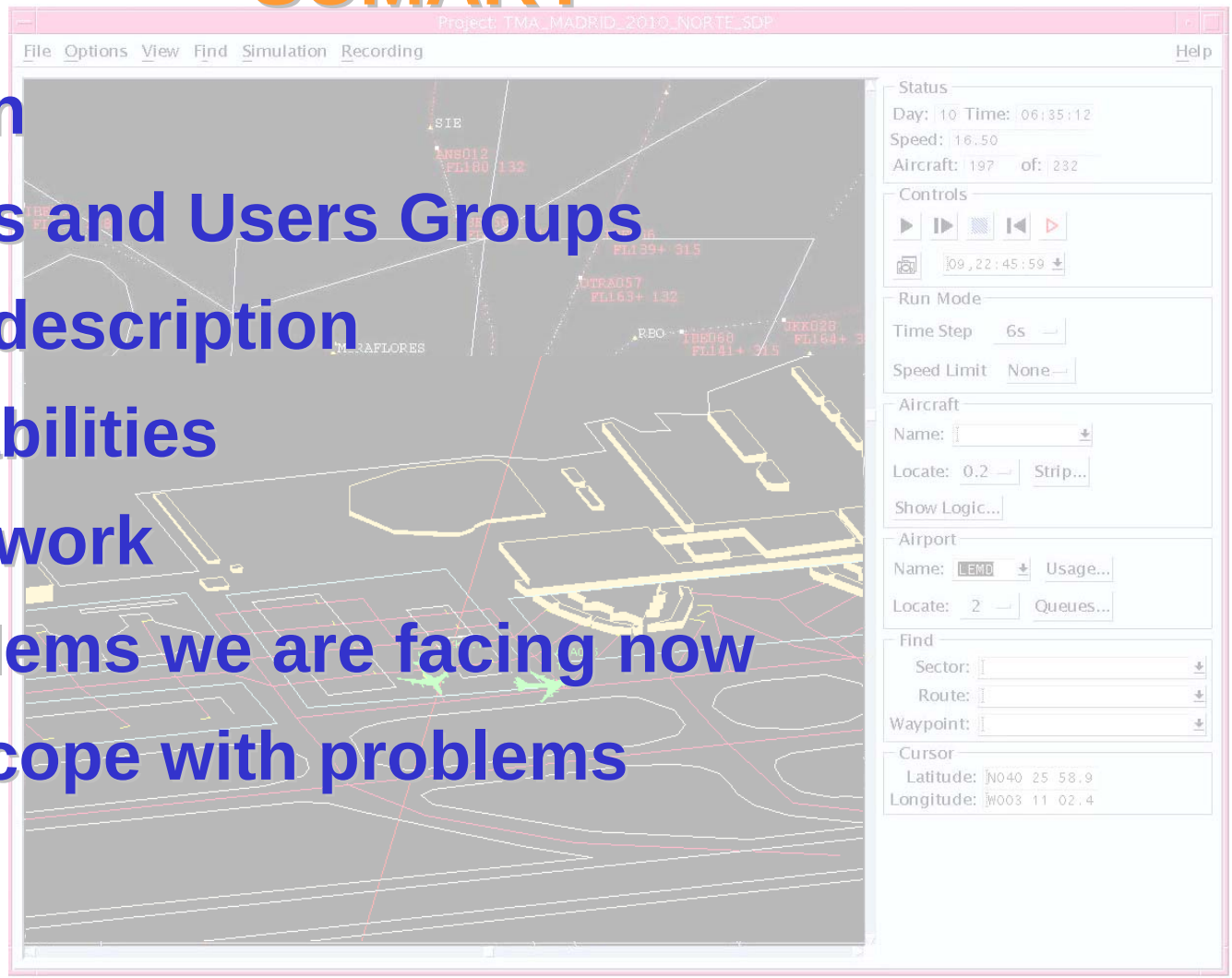
INTRODUCTION



- Manuel Dorado (AENA) mdorado@aena.es
- Representing TAAM Users Community
- Aim of this presentation
  - Report on the TAAM Users Groups
  - Describe tool capabilities (users viewpoint)
  - Describe day to day use of the tool
  - Mention the problems users have
  - Mention on-going actions

SUMARY

- Introduction
- TAAM users and Users Groups
- TAAM tool description
- TAAM capabilities
- Day to day work
- Some problems we are facing now
- Actions to cope with problems
- Conclusion



TAAM Users

Airspace Planners and Air Services Providers

- AENA, Spain
- Airservices Australia
- Airways Corporation of NZ
- ATNS, South Africa
- CAA, UK
- Departamento do Aviaco Civil Brazil
- DFS Deutsche Flugsicherung, Germany
- Eurocontrol
- FAA, USA
- Finnish CAA
- Jamaica CAA
- JCAB, Japan
- NATS, UK
- NavCanada
- NLR, The Netherlands
- SCTA, France
- Skyguide, Switzerland

Airports

- Baltimore, USA
- Chicago O'Hare International, USA
- Dallas Fort Worth International, USA
- Haneda, Tokyo, Japan
- John F Kennedy International, USA
- Kuala Lumpur, Malaysia
- LaGuardia International, USA
- Las Vegas International, USA
- Louisville Airport, USA
- Minneapolis/St Paul International, USA
- Philadelphia, USA
- San Francisco International, USA
- St Louis International, USA
- Sydney, Australia
- Vienna International, Austria

Airlines

- American Airlines
- Ansett Australia
- British Airways
- Cathay Pacific
- Continental Airlines
- Delta Airlines
- Federal Express
- Northwest Airlines
- Qantas
- Trans World Airlines
- United Airlines
- UPS

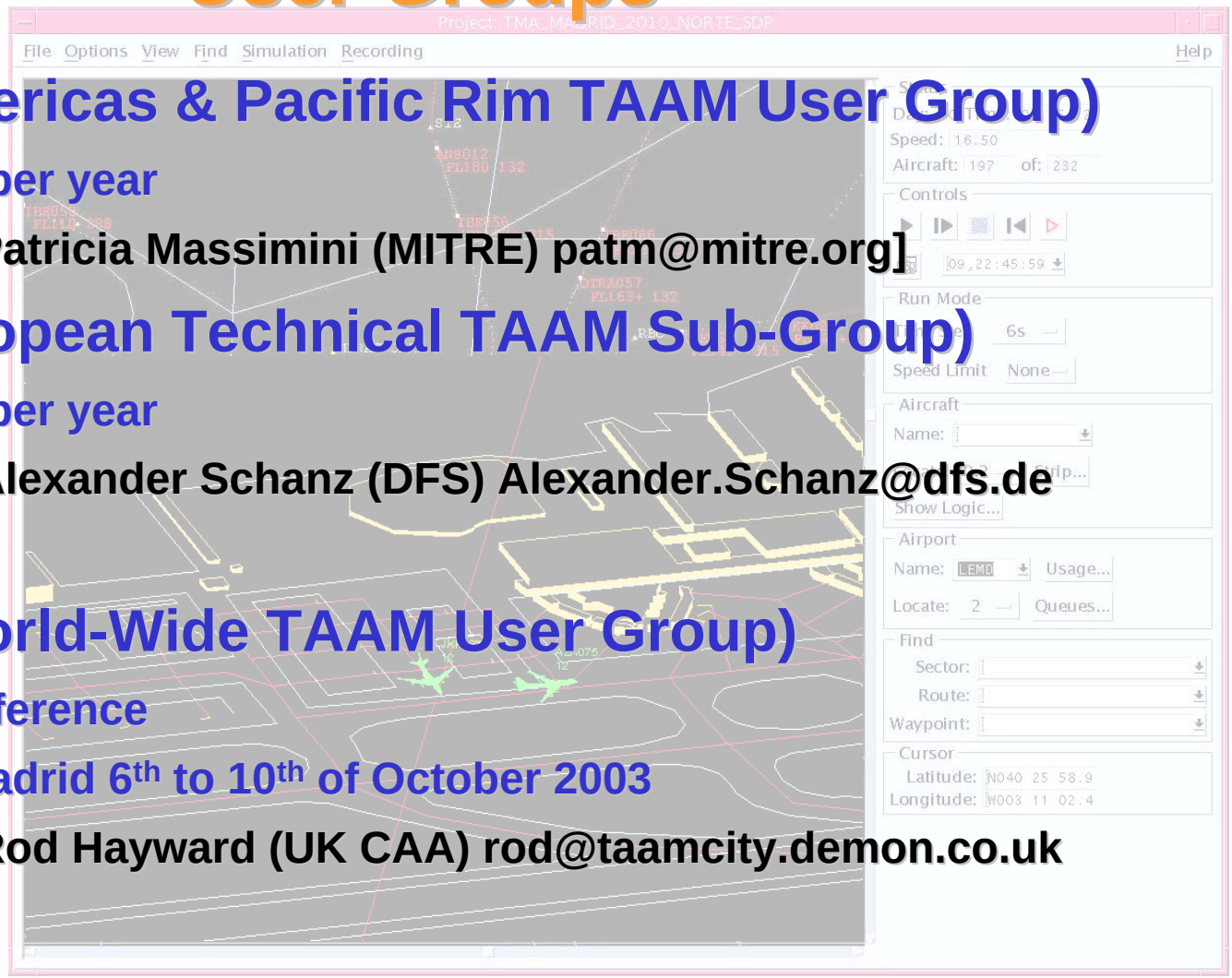
Other Aviation Entities

- Aachen University
- Airplan Australia
- Boeing
- Crown Consulting
- CSSIP - University of South Australia
- DMJM Aviation
- Edwards and Kelcey
- Embry-Riddle Aeronautical University
- ENRI, Japan
- George Mason University
- Landrum and Brown
- Leigh Fisher and Associates
- Lockheed Martin
- MITRE CAASD
- NASA
- Ricondo & Associates
- Thales ATM
- The Ambidji Group

Information from Preston Aviation Solutions™ (a Boeing Company)

www.preston.net

User Groups

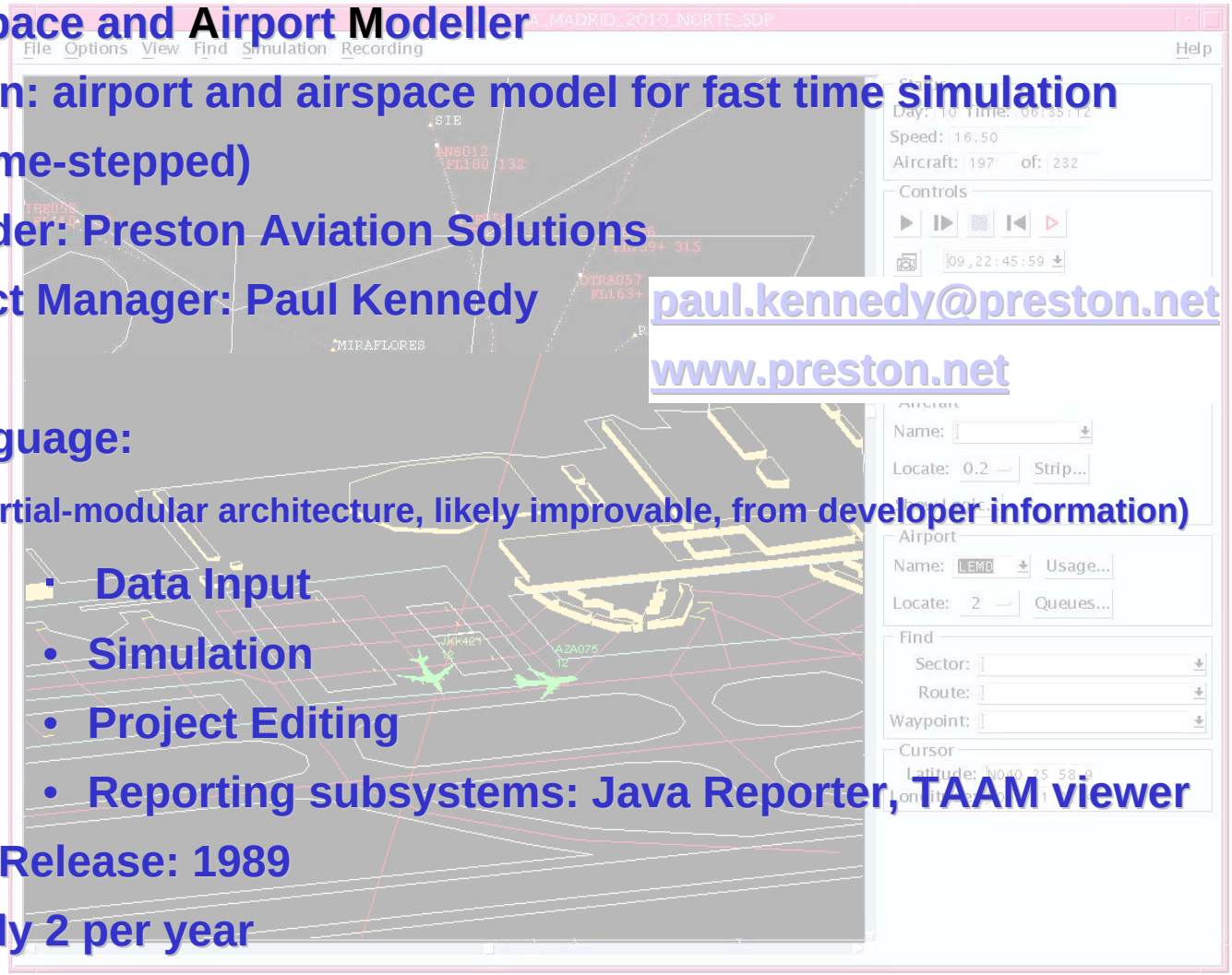


- **APTUG (Americas & Pacific Rim TAAM User Group)**
  - 2 meetings per year
  - Chairman: Patricia Massimini (MITRE) patm@mitre.org]
- **ETTSG (European Technical TAAM Sub-Group)**
  - 2 meetings per year
  - Chairman: Alexander Schanz (DFS) Alexander.Schanz@dfs.de
- **WWTUG (World-Wide TAAM User Group)**
  - Annual Conference
  - Last one: Madrid 6th to 10th of October 2003
  - Chairman: Rod Hayward (UK CAA) rod@taamcity.demon.co.uk

TAAM Plus Tool overview

- **TAAM: Total Airspace and Airport Modeller**
- **Overall description: airport and airspace model for fast time simulation (stochastic and time-stepped)**
- **Developer / Provider: Preston Aviation Solutions**
  - **TAAM Product Manager: Paul Kennedy**

paul.kennedy@preston.net
www.preston.net

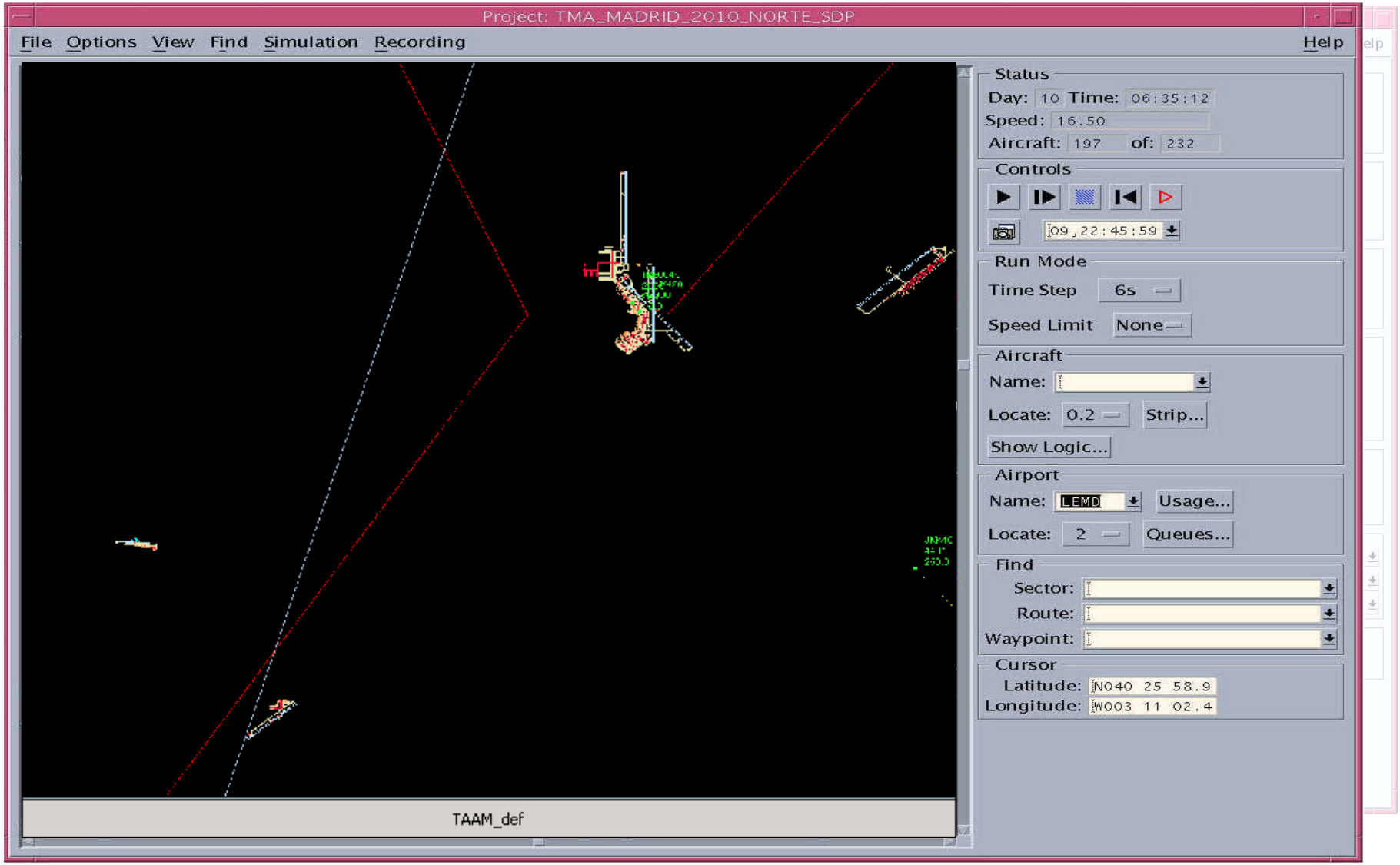


- **Programming language:**

  C++ & JAVA (partial-modular architecture, likely improvable, from developer information)

- **Main modules:**
  - **Data Input**
  - **Simulation**
  - **Project Editing**
  - **Reporting subsystems: Java Reporter, TAAM viewer**
- **First Commercial Release: 1989**
- **Releases: currently 2 per year**
- **Sun Solaris and Red-Hat Linux versions**

Example of airport-airspace simulation

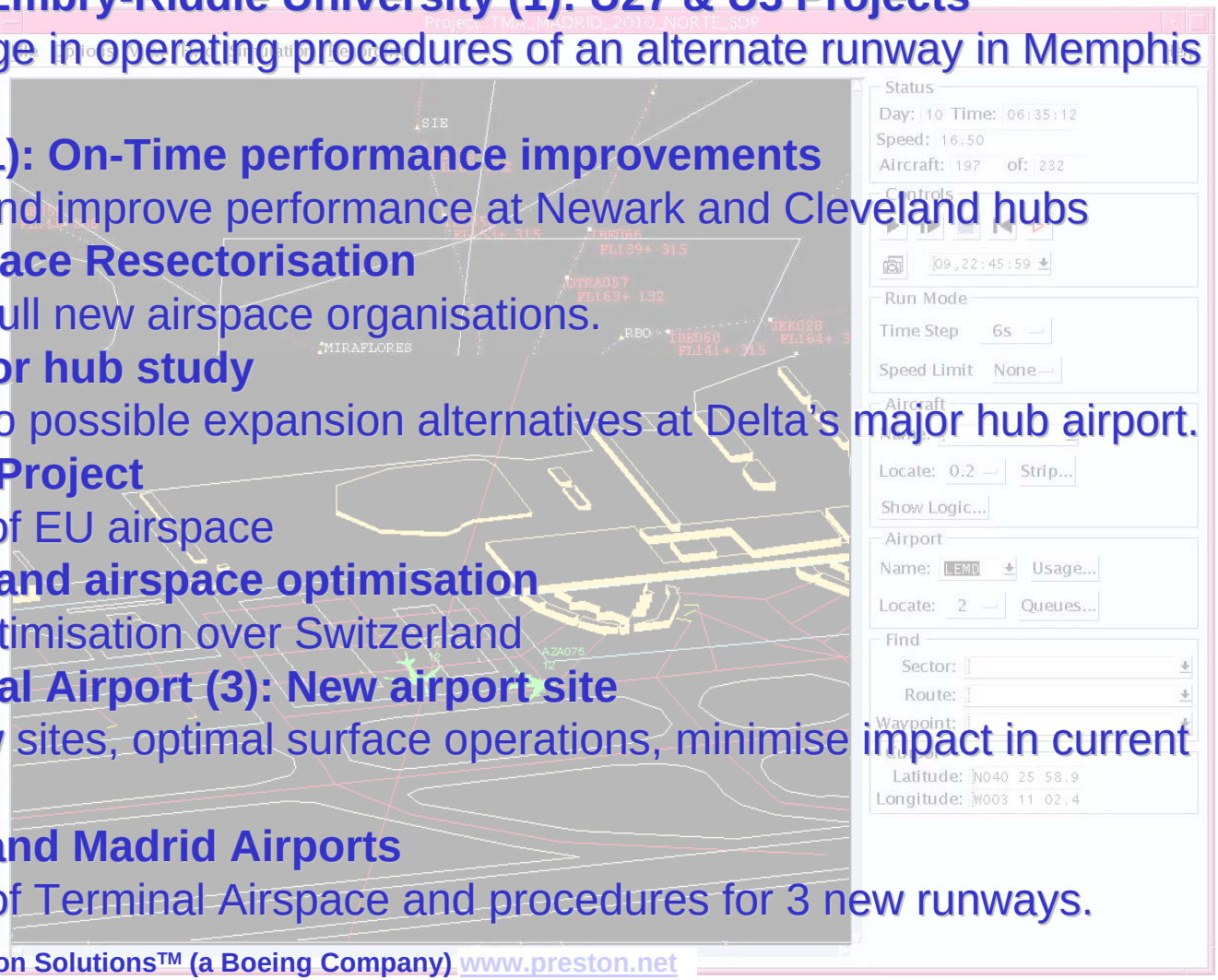


TAAM Capabilities / Functionalities overview

- Airport and airspace model (somehow "Gate-to-Gate"):
  - Airport model: apron (gates), taxiway (ground movement and traffic interference), runway (queues, high speed exits,…).
  - Terminal airspace: departures (SID's) and arrival/approaches flows (STAR's, sequencing, hold stacks, vectoring, tromboning,…)
  - En-route airspace: en-route sectors (tactical controller, conflict detection and resolution,…)
- Rulebase: customisable set of logic clauses to dynamically determine the use or behaviour of model elements (flights, runways,…)
- Including also: aircraft performances, ground model, ATCo workload model, randomisation, fuel burn,…
- Pre-processing input: Graphical-HMI to introduce input data into TAAM format ASCII files
- Post-processing output: Java Reporter, TAAM Viewer, ASCII files

Some projects

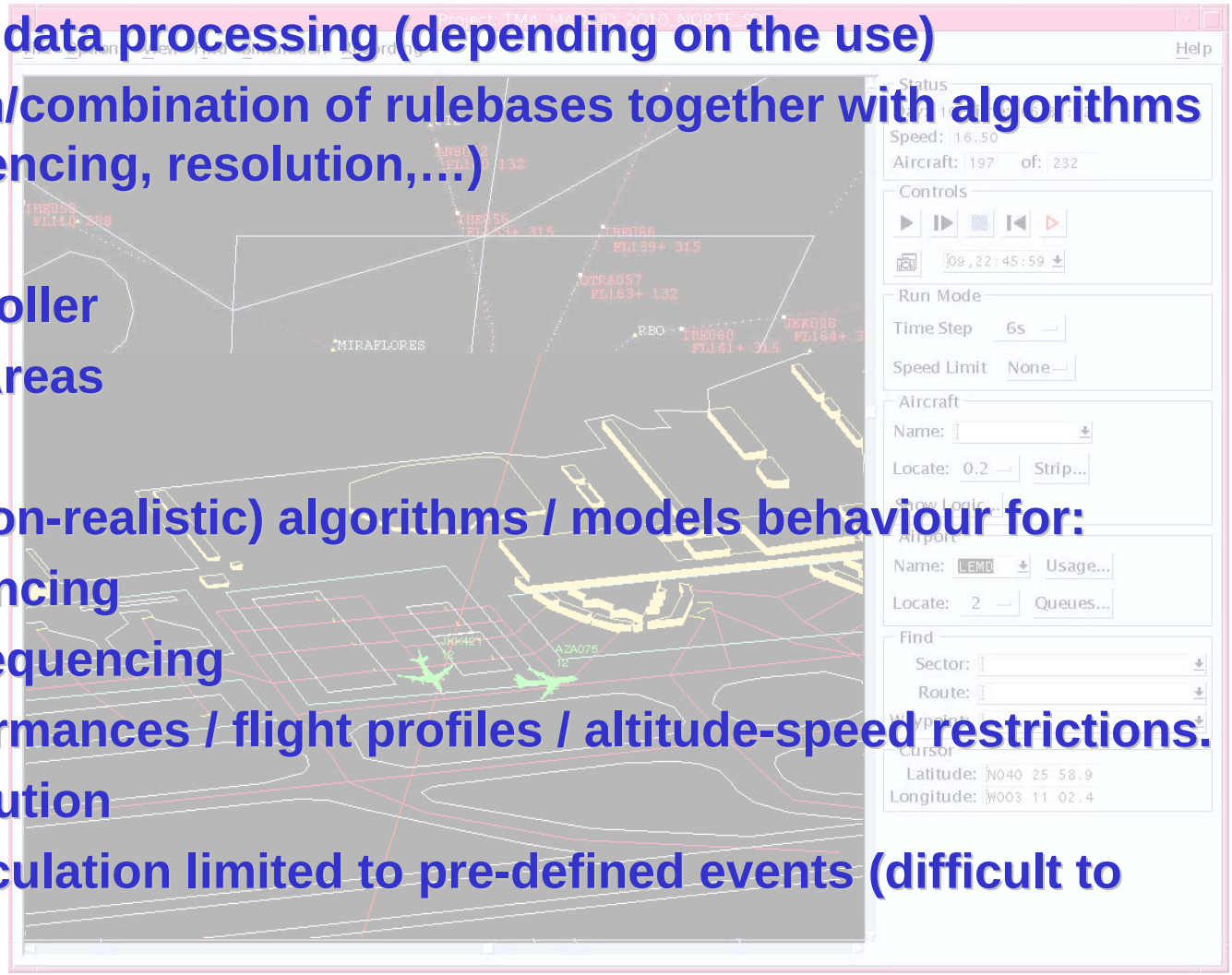
- **Federal Express and Embry-Riddle University (1): U27 & U3 Projects**
  - ⇨ Analysis of change in operating procedures of an alternate runway in Memphis Airport
- **Continental Airlines (1): On-Time performance improvements**
  - ⇨ Reduce delays and improve performance at Newark and Cleveland hubs
- **DFS (1): Munich Airspace Resectorisation**
  - ⇨ Select among 4 full new airspace organisations.
- **Delta Airlines (1): Major hub study**
  - ⇨ Select among two possible expansion alternatives at Delta's major hub airport.
- **NLR (2): ONESKY EC Project**
  - ⇨ Full new design of EU airspace
- **Skyguide (3): Switzerland airspace optimisation**
  - ⇨ Sector design optimisation over Switzerland
- **Las Vegas International Airport (3): New airport site**
  - ⇨ Feasibility of new sites, optimal surface operations, minimise impact in current operations.
- **AENA (3): Barcelona and Madrid Airports**
  - ⇨ Full new design of Terminal Airspace and procedures for 3 new runways.



(1) Information from Preston Aviation Solutions™ (a Boeing Company) www.preston.net
(2) Information from last WWTUG
(3) Information from the Companies

PROBLEMS reported by Users

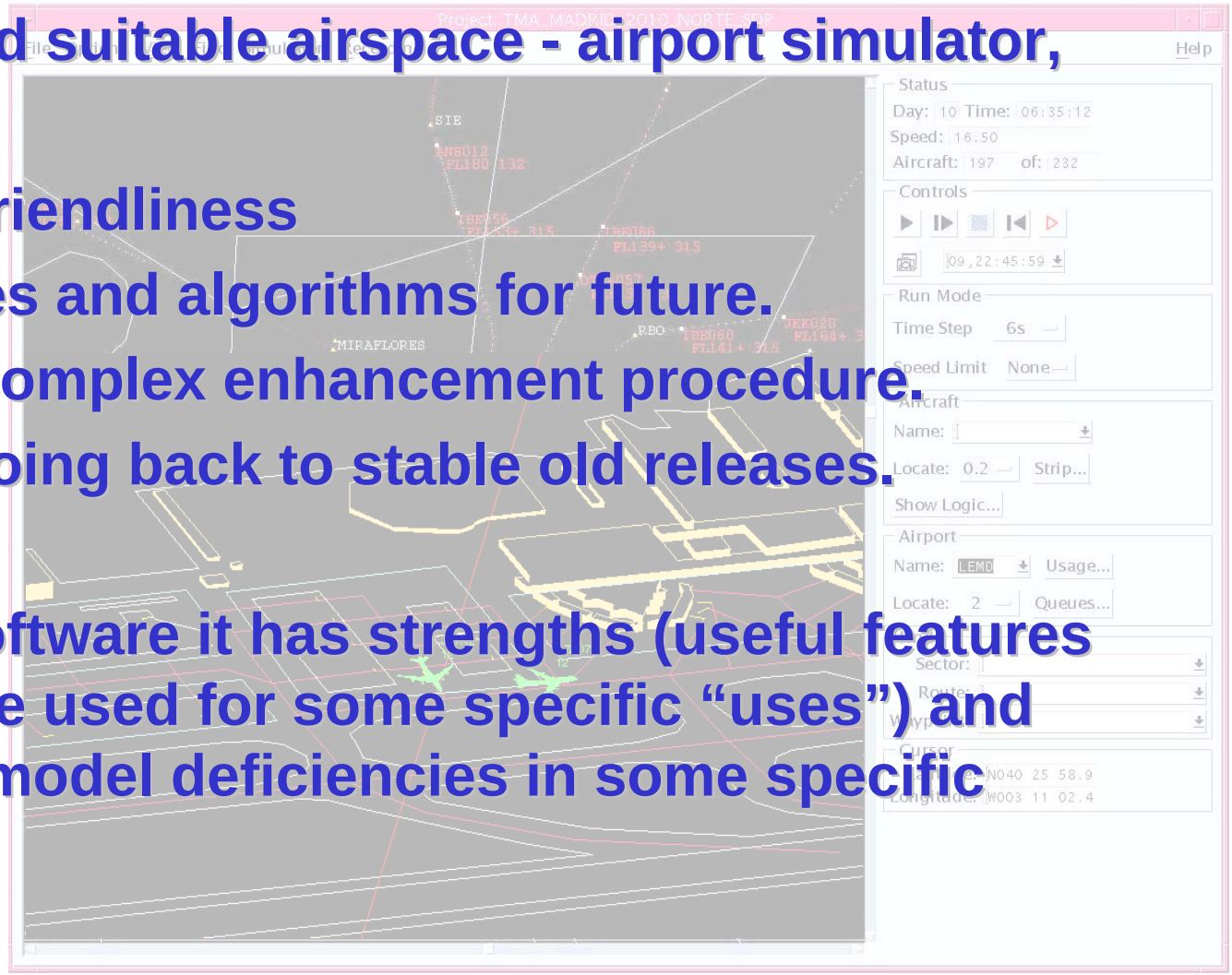
- Hard input / output data processing (depending on the use)
- Difficult application/combination of rulebases together with algorithms switched-on (sequencing, resolution,…)
- Some model gaps:
  - Planner controller
  - Special Use Areas
  - Helicopters
- Some simplified (non-realistic) algorithms / models behaviour for:
  - Arrival sequencing
  - Departures sequencing
  - Aircraft performances / flight profiles / altitude-speed restrictions.
  - Conflict resolution
  - Workload calculation limited to pre-defined events (difficult to customise)
  - Fuel burn



Users's feelings and findings

Useful, wide and suitable airspace - airport simulator, but…

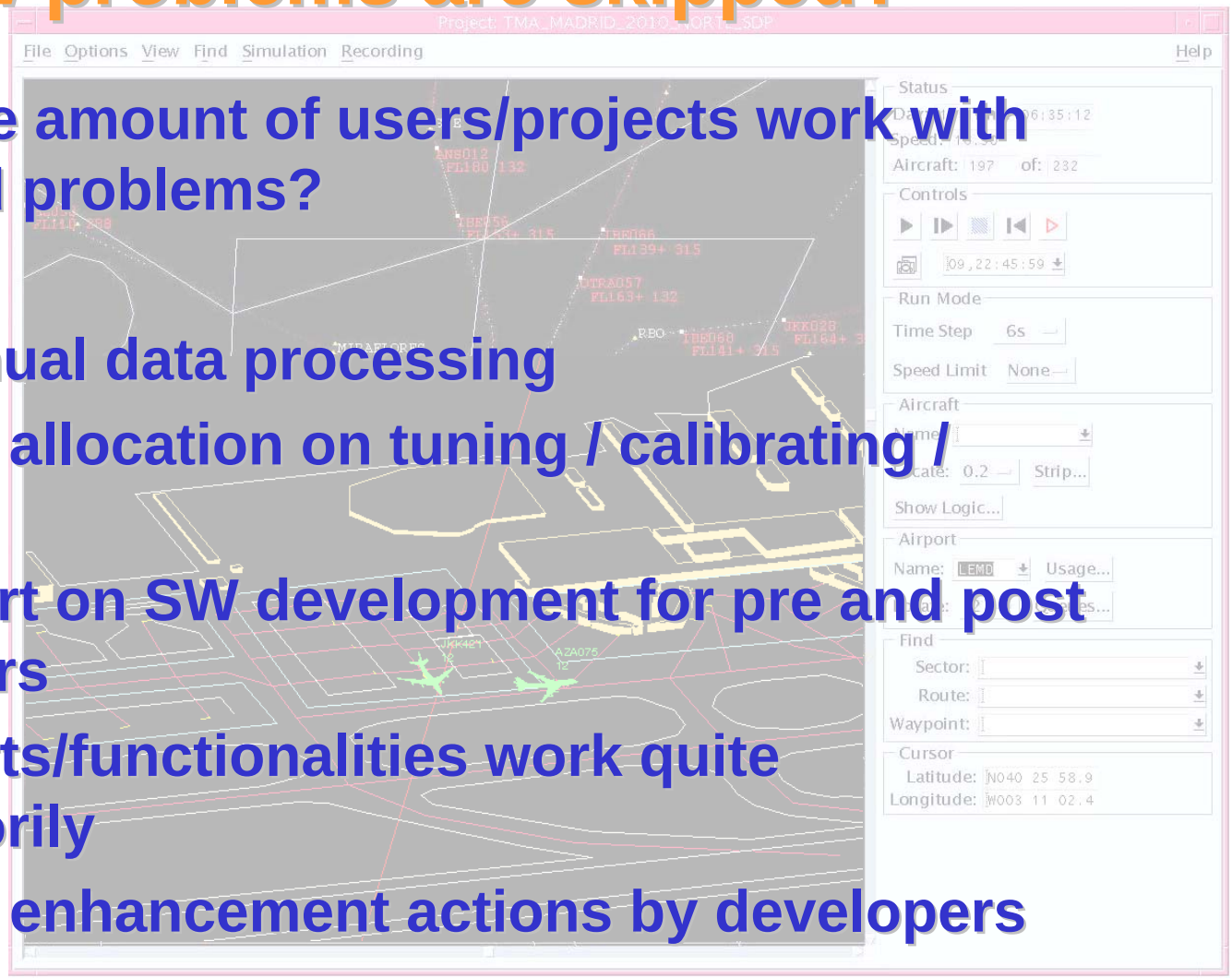
- **Limited user friendliness**
- **Rigid rulebases and algorithms for future.**
- **Lengthy and complex enhancement procedure.**
- **Some users going back to stable old releases.**



As any other software it has strengths (useful features advisable to be used for some specific "uses") and weaknesses (model deficiencies in some specific aspects).

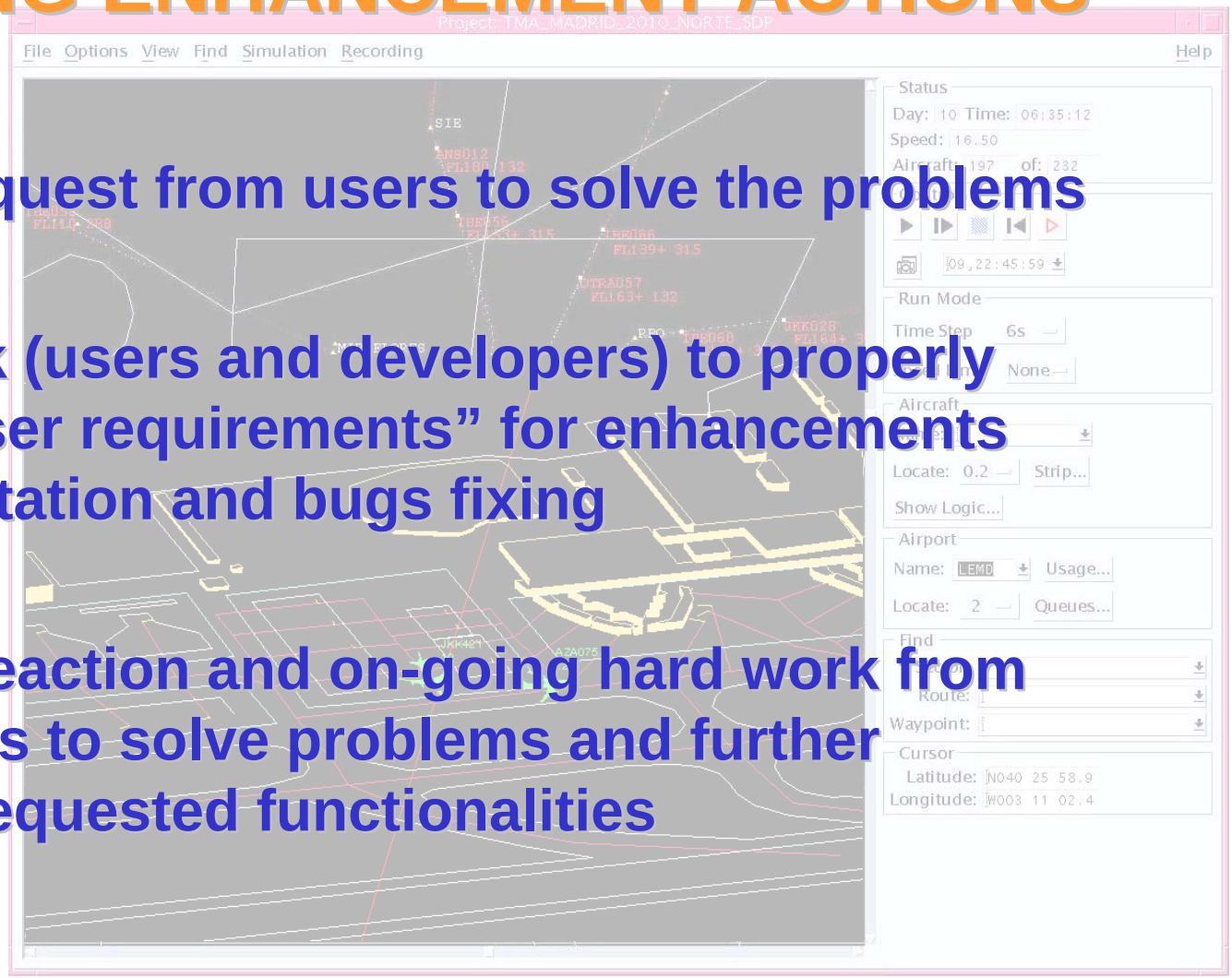
How problems are skipped?

How these huge amount of users/projects work with the mentioned problems?



- ✓ **Hard manual data processing**
- ✓ **Big effort allocation on tuning / calibrating / cheating**
- ✓ **Wide effort on SW development for pre and post processors**
- ✓ **Some parts/functionalities work quite satisfactorily**
- ✓ **On-going enhancement actions by developers**

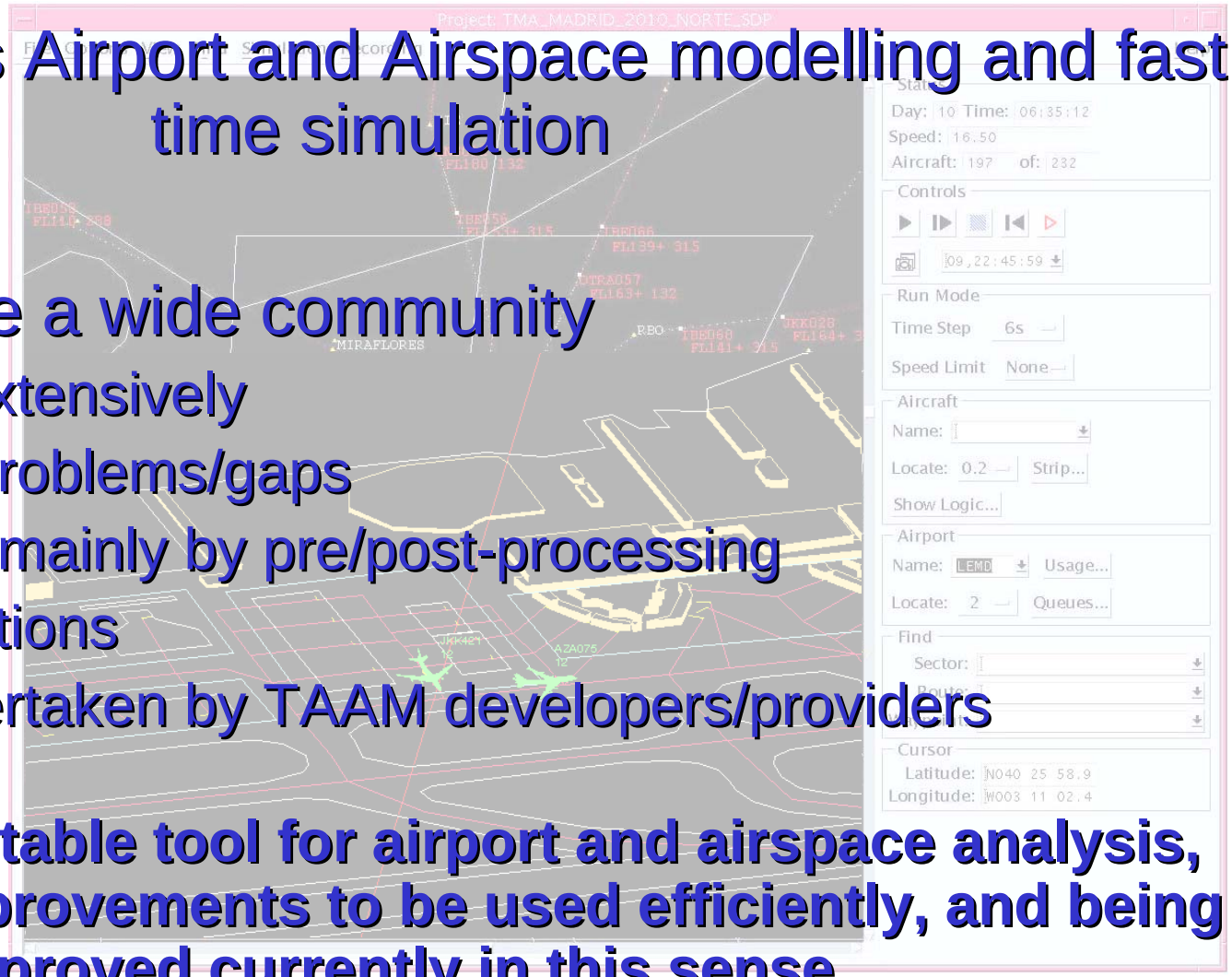
ON-GOING ENHANCEMENT ACTIONS



- ✓ **Strong request from users to solve the problems**
- ✓ **Hard work (users and developers) to properly define "user requirements" for enhancements implementation and bugs fixing**
- ✓ **Positive reaction and on-going hard work from developers to solve problems and further develop requested functionalities**

CONCLUSION

TAAM provides Airport and Airspace modelling and fast time simulation



TAAM Users are a wide community

- Using TAAM extensively
- Despite of its problems/gaps
- Skipping them mainly by pre/post-processing
- Asking for solutions
- Positively undertaken by TAAM developers/providers

Technically, suitable tool for airport and airspace analysis, which needs improvements to be used efficiently, and being improved currently in this sense